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Engineering: Education and Innovation

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2021

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Mike Mimirinis

Shannon Chance

Inês Direito

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## Research in Engineering Education Symposium & Australasian Association for Engineering Education Conference

5 – 8 December, 2021 - Perth, WA



### WORKSHOP

## Variation and phenomenography: recognising and understanding qualitatively different experiences of engineering learning

Mike Mimirinis<sup>a</sup>, Shannon Chance<sup>b,c</sup>, and Inês Direito<sup>c</sup>

University of West London<sup>a</sup>, CREATE, Technological University Dublin<sup>b</sup>, Centre for Engineering Education, UCL<sup>c</sup>  
Corresponding Author's Email: [s.chance@ucl.ac.uk](mailto:s.chance@ucl.ac.uk)

### OVERVIEW OF WORKSHOP

Phenomenography is a research methodology well suited to exploring how engineering students and academics experience engineering education. The significance of phenomenography to engineering education research (EER) and practice lies in its potential to account for differences and changes in meanings individuals hold about concepts and practices in their discipline. By emphasizing variation, this methodology highlights that existing forms of knowledge are not fixed and therefore these are possible to change. The dataset used for hands-on analysis in this workshop has to do with how individuals understand design and knowledge creation, how this varies by professional degree program (architecture vs. civil engineering), and how student conceptualisations change or evolve over time.

Case and Light (2011) identified phenomenography as one of the emerging qualitative methodologies in EER, as it can contribute to broadening the type of research questions and ways of thinking about engineering education. They suggest this methodology is well suited to explore variations in the ways students understand engineering concepts. This can support the design of engineering curricula, pedagogical approaches, and assessment methods.

This session describes using phenomenographic research methodology to identify variation in the ways individuals understand phenomena. The methodology is relevant to studying contexts where learning and teaching occur, including higher education. It seeks to identify ways in which individuals differ, by identifying different conceptions held by individuals within and across a group (Marton & Booth, 1997). The methodology helps researchers identify shared conceptions among group members and describe relationships among the various conceptions held.

### ACTIVITIES

In this workshop, participants will be introduced to the historical development of phenomenography and will examine its position within the wider qualitative paradigm. They will discover and practice using this methodology in conducting engineering education research, applying phenomenographic approaches to generating and analysing data. They will work in groups to undertake their own analysis of interview data from a study with engineering students exploring how they conceptualize design creation. Participants are likely to have prior understanding of issues explored in the interview transcripts and will feel motivated to contribute to group work, discussing their research interests with facilitators and other participants. At the end of the hands-on data analysis activity, workshop participants will discuss their approaches to analysing the data and compare their findings. Ultimately, participants will discuss how the results of phenomenographic studies might contribute to more meaningful engagement in engineering education and research.

### TARGET AUDIENCE

No prior knowledge is required to participate in the activities.

### OUTCOMES

By the end of this workshop, participants should be able to:

- Describe aspects of the theories underpinning the phenomenographic approach to generating and analysing qualitative interview data.

- Identify implications of variation for teaching and learning in Engineering Education.
- Work effectively and efficiently within the time constraints of the workshop to analyse data and present results of phenomenographic analysis.
- Discuss variation as a tool for enhancing student learning and pedagogical outcomes.

## **REFERENCES**

Case, J. M., & Light, G. (2011). Emerging Research Methodologies in Engineering Education Research. *Journal of Engineering Education*, 100(1), 186–210.

Marton, F., & Booth, S. (1997). Learning and Awareness. Mahwah, NJ: Lawrence Earlbaum Associates.

## **KEYWORDS**

Methodology, phenomenon, qualitative analysis.

## **PRESENTERS' BACKGROUNDS**

The group has delivered similar workshops for multiple audiences in engineering education and general higher education. The lead presenter is an expert in the subject with multiple publications using the methodology.